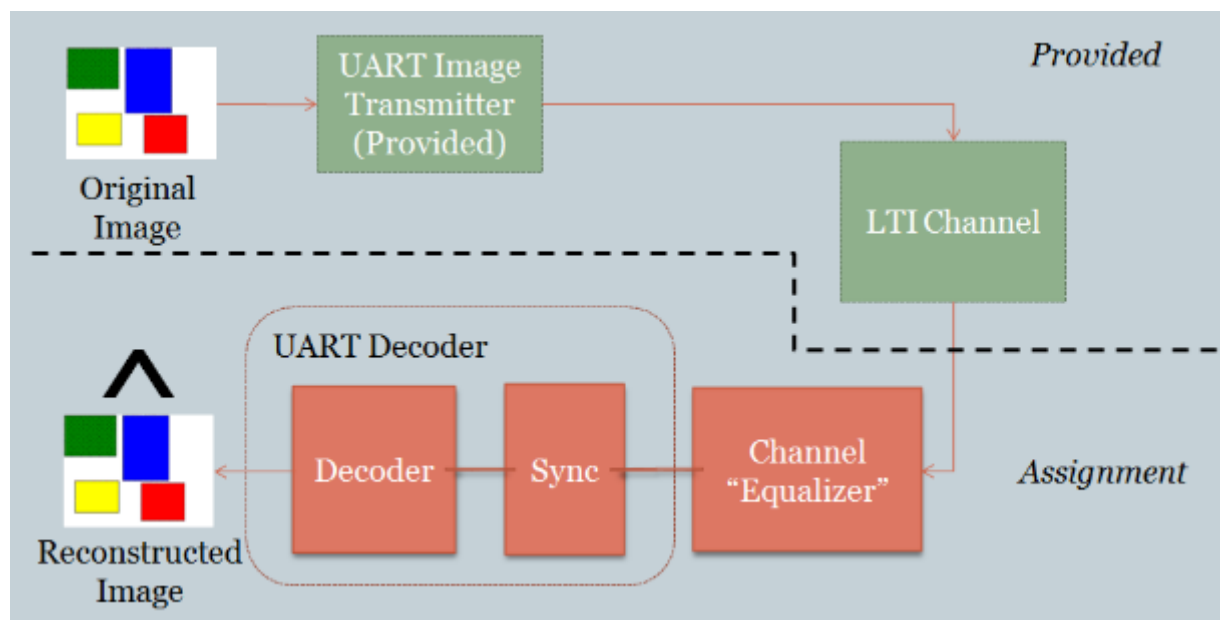


EE49 Lab 2: Introduction to Digital Communication Lab: UART Communication, Sync, and Channel Correction

Goal

In Lab 2, our goal is introduce you to aspects of digital signaling, including simple channel codes and the effect of sending these signals over non-ideal communication channels. In Part 1, we will ask you to demodulate a bitstream which is encoded with one widely used digital protocol: Universal Asynchronous Receive/ Transmit (UART). This communication protocol is used in nearly every embedded device, from mp3 players to digital watches. It is the basis for many older communication standards like RS-232 and Infrared TV remotes. In Part 2, we will use our UART decoder to receive a 256-color image. First, we will receive the image on an ideal channel. Next, we will receive the image over an LTI non-ideal channel and observe the effects of this non-ideality. Finally, you will design a simple equalizer to estimate the effect of the channel and correct for it before decoding the signal. We begin with a short primer on UART communications.

Lab Overview



Course Overview

This lab is from a course developed at Stanford University entitled *Building Networked Systems*. The course was first taught with a trial group of students in the Spring 2011 quarter. With the software/hardware combination of LabVIEW and the [NI USRP](#), students were able to build and explore each element of a complete communications system signal chain. The course progression covered topics including channel coding, modulation, demodulation, timing recovery and culminated with students building their own protocol.

Course evaluations affirmed that students were highly engaged in and benefited greatly from the EE 49 class. “The course evaluations for our class were fantastic,” said Katti. “Students rated the class 4.94/5.0, likely making it one of the highest rated among all classes in the School of Engineering at Stanford.” To learn more about the course view the case study entitled: [Designing Hands-On Wireless Communications Labs With the NI Universal Software Radio Peripheral and LabVIEW](#).

These materials are considered a work-in-progress and reflect the first run of the course. The course is anticipated to run again in the Spring of 2012.

Required Components:

LabVIEW Full or Pro

Experiment:

The PDF laboratory procedure is attached along with starting-point VI's for the students. LaTeX source is included so that it can be customized by the instructor.

Contact Information

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